



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 09/788,316 | 02/16/2001 | E. Neil Lewis | S0001-009002 | 7045 |
| 7590 | 11/12/2003 | | EXAMINER | |
| Kristofer E. Elbing 187 Pelham Island Road Wayland, MA 01778 | | | LAVARIAS, ARNEL C | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2872 | |

DATE MAILED: 11/12/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | |
|------------------------------|-----------------|--------------|
| Office Action Summary | Application No. | Applicant(s) |
| | 09/788,316 | LEWIS ET AL. |
| Examiner | Art Unit | |
| Arnel C. Lavaras | 2872 | |

-- The MAILING DATE of this communication app ars n th cov r sh et with the correspondenc address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 04 September 2003.

2a) This action is FINAL. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-38,40-58 and 64 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) Claim(s) _____ is/are allowed.

6) Claim(s) 1-38,40-58 and 64 is/are rejected.

7) Claim(s) _____ is/are objected to.

8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) The proposed drawing correction filed on _____ is: a) approved b) disapproved by the Examiner.
 If approved, corrected drawings are required in reply to this Office action.

12) The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some * c) None of:

- Certified copies of the priority documents have been received.
- Certified copies of the priority documents have been received in Application No. _____.
- Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) The translation of the foreign language provisional application has been received.

15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) Notice of References Cited (PTO-892) 4) Interview Summary (PTO-413) Paper No(s). _____ .

2) Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) Notice of Informal Patent Application (PTO-152)

3) Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ . 6) Other: _____ .

DETAILED ACTION

Oath/Declaration

1. The newly submitted supplemental oath/declaration in Paper No. 9, dated 9/4/03, is acknowledged and accepted.

Response to Amendment

2. The amendments to the specification of the disclosure in Paper No. 9, dated 9/4/03, are acknowledged and accepted. In view of these amendments, the objections to the specification in Section 4 of Paper No. 7, dated 3/5/03, are respectfully withdrawn.
3. The amendments to Claims 1, 3, 41, 51, and 58 in Paper No. 9, dated 9/4/03, are acknowledged and accepted. In view of these amendments, the objections to the claims in Section 6 of Paper No. 7, dated 3/5/03, are respectfully withdrawn.
4. The addition of Claim 64 in Paper No. 9, dated 9/4/03, is acknowledged and accepted.
5. The cancellation of Claims 39, 59-63 in Paper No. 9, dated 9/4/03, is acknowledged and accepted.

Response to Arguments

6. The Applicants' arguments, see in particular Pages 18-19 of Paper No. 9, filed 9/4/03, with respect to the rejection(s) of Claim(s) 1-38, 40-58 under 35 U.S.C. 102(b) and 103(a) have been fully considered and are persuasive. Therefore, the rejection has been

withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of newly discovered reference to Kley et al. (U.S. Patent No. 6172743).

7. Claims 1-38, 40-58, 64 are rejected as follows.

Specification

8. The attempt to incorporate subject matter into this application by reference to U.S. Application No. 09/345672 is improper because this application has been abandoned and has not been previously published or made publicly available.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

10. Claims 1-6, 9-10, 15, 22-23, 28, 30-31, 41-49, 58, 64 are rejected under 35 U.S.C. 102(e) as being anticipated by Kley et al. (U.S. Patent No. 6172743).

With regard to Claims 1, 15, 22-23, 28, 41-42 47-49, 58 and 64, Kley et al. discloses a spectrometer (See for example Figures 1-5) comprising an array of illumination sources, such as semiconductor-based sources or LED's (See 2, 3A, 3B in Figure 1; col. 4, line 65-col. 6, line 11; col. 9, line 65-col. 10, line 20), positioned to differently illuminate different parts of a detection area (See 6 in Figure 1) by directing a plurality of differently

directed beams of light toward the detection area from different illumination source positions; an image detector (See 8 in Figure 1) responsive to the different parts of the detection area; and a spectroscopic signal output (See 8, 7, 9 in Figure 1) responsive to relative amounts of light from the different ones of the plurality of beams in different spectral regions received by the detector after interaction with a sample in the different parts of the detection area (See col. 8, line 50-col. 10, line 20). Kley et al additionally discloses a curved reflector for collimating the light from the sources (See 1 in Figure 1; col. 8, lines 50-56); the sources (See 3A, 3B in Figure 1) illuminating the sample with at least a first beam and a second beam at the same time (See col. 9, lines 8-38); the beam also being concentrated by focusing (See for example col. 5, line 1-9; col. 5, lines 43-55); the sources being of a same type (See for example 3A, 3B in Figure 1, which are both LED's); the sources being broadband (See col. 5, line 1-col. 6, line 11); a plurality of narrow-band dielectric filter elements located in an optical output path of at least one of the sources (See 4A, 4B, 5A, 5B in Figure 1; col. 5, lines 29-42).

With regard to Claims 3-4, 9-10, 43, 46, Kley et al. discloses at least a first spectrally selective element and at least a second spectrally selective element (See 4A, 4B, 5A, 5B in Figure 1; 17A, 17B, 5A, 5B in Figure 2), the first having a different spectral response than the second, both being located in the optical path between one of the illumination sources and the detector, both being connected to switched outputs, and both having different spectral responses that correspond to different absorption bands of a predetermined substance (See col. 8, line 50-col. 10, line 20).

With regard to Claim 2, 5-6, 44-45, Kley et al. discloses a switching array having a plurality of switched outputs that are each operatively connected to an input of at least one of the illumination sources (See 10, 13 in Figure 1; col. 8, line 50-col. 9, line 38). The switching array is operative to define an intensity level (such as on and off) for one or more of the sources by determining an illumination time period for the one of the sources relative to an illumination time period for another of the sources.

With regard to Claims 30-31, Kley et al. discloses the illumination sources being positioned to illuminate different sub-areas of the detection area and a first portion of the beams overlapping within the sample area (See Figure 1). The Examiner notes that light from each source 2, 3A, 3B of Figure 1 will overlap each other and illuminate a different portion of the detection area (i.e. the finger 6 in Figure 1). The combined illumination of the sources will fully illuminate the finger.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.
12. Claims 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kley et al. in view of Fateley et al. (U.S. Patent No. 5257086, or Fateley '086), of record.

Kley et al. discloses the invention as set forth above in Claims 1-2, except for the apparatus further including sequence logic operative to cause the switching array to

switch the sources in a sequence of overlapping spatial patterns, such as a Hadamard sequence. However, Fateley '086 teaches an optical spectrophotometer that includes an array of light emitting diodes (LED's) for illuminating a sample (See Figures 1-2). In particular, the apparatus includes a switching array having a plurality of switched outputs that are each operatively connected to an input of at least one of the illumination sources (See 20 in Figure 1; 108, 110 in Figure 2). The switching array is operative to define an intensity level (such as on and off) for one or more of the sources by determining an illumination time period for the one of the sources relative to an illumination time period for another of the sources. Fateley '086 additionally discloses sequencing logic operative to cause the switching array to switch the sources in a Hadamard sequence. See col. 4, lines 7-30; col. 5, lines 11-55. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the apparatus of Kley et al. further include sequence logic operative to cause the switching array to switch the sources in a sequence of overlapping spatial patterns, such as a Hadamard sequence, as taught by Fateley '086, take advantage of the multiplexing advantage gained by utilizing intensity masking encoded by a Hadamard sequence (See col. 1, lines 26-45; col. 5, line 56-col. 6, line 33).

13. Claims 14, 16-21, 24-27, 29, 40, 57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kley et al.

With respect to Claims 14, 40, 57, Kley et al. discloses the invention as set forth above, except for the sources being substantially the same. It is well known in the art to utilize multiple sources that are exactly the same to increase the amount of light flux

incident on the sample. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the sources be substantially the same for the purpose of increasing the amount of light incident on the sample, and hence increase the signal-to-noise ratio of the measurement system.

With regard to Claims 16-19, Kley et al. discloses the invention as set forth above. Kley et al. further discloses placing the sources near the detection area (See Figure 1). Kley et al. lacks the spectrometer being either a microscopic or macroscopic instrument producing luminous flux of at most 10 millilumens to 1 lumen or the sources being placed within 1 cm of the detection area. The Examiner notes that the above limitations serve to adjust the luminous flux incident on the sample. Having the spectrometer be either a microscopic or macroscopic instrument producing luminous flux of at most 10 millilumens to 1 lumen or the sources be placed within 1 cm of the detection area in the apparatus are merely that of preferred embodiments, and that no criticality has been disclosed in the specification of the disclosure. The reasons for having the spectrometer be either a microscopic or macroscopic instrument producing luminous flux of at most 10 millilumens to 1 lumen or the sources be placed within 1 cm of the detection area are given for example on Pages 3 and 11 of the specification of the disclosure. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the spectrometer be either a microscopic or macroscopic instrument producing luminous flux of at most 10 millilumens to 1 lumen or the sources be placed within 1 cm of the detection area, since one skilled in the art would have known to 1) design the size of the instrument appropriately based on optical performance and cost, 2)

design the optical portion of the instrument to provide the appropriate amount of light onto the sample at the detection area, 3) adjust the mechanical layout of the instrument such that the sources are within 1 cm of the detection area, all these based on optical performance, cost, and intended use of the instrument.

With regard to Claims 20-21, 29, Kley et al. discloses the invention as set forth above, except for the sources having supply voltages of less than 5-12 volts or the sources being connected to a single power supply. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the sources have supply voltages of less than 5-12 volts or the sources being connected to a single power supply, since one skilled in the art would know that typical driving voltages for illumination sources, such as LED's, laser diodes, and incandescent lamps, are in the range of 5-12 volts, and that one would drive a number of such sources with a single power supply to reduce the cost and complexity of the voltage/power supplying system.

With regard to Claims 24-27, Kley et al. discloses the invention as set forth above, except for the sources being, for example, broadband infrared sources, incandescent sources, or narrow-band infrared sources. However, the use of broadband infrared sources, incandescent sources, or narrow-band infrared sources in the apparatus is merely that of a preferred embodiment. No criticality for the use of such sources has been disclosed in the specification of the disclosure, and that the reasons for the use of such sources are given for example on Pages 3 and 8 of the specification of the disclosure. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the sources be one of broadband infrared sources,

incandescent sources, or narrow-band infrared sources, since one skilled in the art would know to choose the appropriate light illumination sources based on requirements of wavelength, output power, and design considerations, such as cost, size and weight.

14. Claims 34-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kley et al. in view of Henderson et al. (U.S. Patent No. 3910701).

With regard to Claims 34-35, Kley et al. discloses the invention as set forth above, except for the apparatus further comprising a circular support for the array, wherein the detection area is located along a central axis of the circular support and wherein the support surrounds an optical path from the detection area to the detector. However, Henderson et al. teaches a method and apparatus for spectroscopic measurements (See for example Figures 2-3, 5-6), wherein a plurality of light sources (See for example 16a, 17c in Figure 3), such as LED's, is mounted on a circular support (See 13 in Figure 3; 15 in Figure 5), and the detection area (See 21 in Figure 3; 112 in Figure 5) is located along a central axis of the circular support, which surrounds an optical path from the detection area to the detector (See for example 18 in Figure 3; 106 in Figure 5). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the detection area is located along a central axis of the circular support and wherein the support surrounds an optical path from the detection area to the detector, as taught by Henderson et al., in the apparatus of Kley et al., for the purpose of rigidly supporting the plurality of light sources, while reducing the size and weight of the system.

With regard to Claim 36, Kley et al. in view of Henderson et al. discloses the invention as set forth above, except for the detector being a part of a microscope. Having the detector be a part of a microscope is merely a recitation of a preferred embodiment, and no criticality has been cited for having the detector be a part of a microscope. The reasons for having the detector be a part of a microscope are given for example on Pages 3 and 10-11 of the specification of the disclosure. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the detector be a part of a microscope to reduce the size, weight, and cost of the optical system, since the microscope and the spectrometer are now integrated onto a single device.

15. Claims 32-33, 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kley et al. in view of Malin et al. (U.S. Patent No. 6236047), of record.

With regard to Claim 32, Kley et al. discloses the invention as set forth above, except for the detector being located to receive beams from the illumination sources after they are reflected off of the sample. However, Malin et al. discloses such a reflection-type spectroscopic arrangement (See for example sample 16, detector 26, source 12 in Figure 1). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the detector be located to receive beams from the illumination sources after they are reflected off of the sample, as taught by Malin et al., in the spectrometer of Kley et al. for the purpose of performing spectroscopic measurements on opaque or non-transparent samples.

With regard to Claims 33 and 38, Kley et al. discloses the invention as set forth above, except for the detector including a plurality of detector elements, such as a linear detector array, wherein the detection area is divided into a plurality of detection sub-areas, and wherein each of the detector elements is aligned with one of the detection sub-areas. However, Malin et al. teaches an apparatus for determining the concentration of an analyte present in a sample (See Figures 1A, 1B) as set forth above. In particular, Malin et al. teaches using an array of detector (See 18B in Figure 1B; 60 in Figure 2A, 2B). Additionally, it is well-known in the art of optical spectroscopy to divide the detection area/sample into small regions which are aligned with detector array elements designed to detect emission only from those regions, i.e. spatial or hyperspectral imagery. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the detector include a plurality of detector elements, such as a linear detector array, wherein the detection area is divided into a plurality of detection sub-areas, and wherein each of the detector elements is aligned with one of the detection sub-areas, as taught by Malin et al., in the spectrometer of Kley et al., for the purpose of providing spectroscopic measurement information based on location on the sample.

16. Claims 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kley et al. in view Bengtsson (U.S. Patent No. 6078390), of record.

With regard to Claim 11, Kley et al. discloses the invention as set forth above, except for the selective elements being reflectors. However, Bengtsson teaches the use of reflective selective elements, such as dichroic beam splitters and wavelength-specific mirrors (See 22, 24 in Figure 1) in spectroscopic apparatus for identifying chemical

species from fluorescence. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the selective elements be reflectors, as taught by Bengtsson, in the spectrometer of Kley et al., for the purpose of improving the signal-to-noise ratio of the system, as well as reducing instrumentation noise, by filtering out unnecessary wavelengths of light.

Additionally, with regard to Claims 12-13, Kley et al. in view of Bengtsson discloses the invention as set forth above, except for the reflectors being generally either parabolic or ellipsoidal. It is noted that the shape of the reflectors, whether planar, parabolic, ellipsoidal, or other non-standard shapes, is dictated by the optical design of the spectroscopic apparatus, and the choice of using a particular shaped reflector is dependent on whether the incoming light is required to be focused, collimated, or dispersed as the light is reflected off the surface. Therefore, it would have been well within the skill of worker in the art to have the reflector be parabolic or ellipsoidal for the purpose of reducing the number of optical elements required, since such reflectors additionally perform collimating and focusing functions, as well as light-reflecting functions.

17. Claims 37, 50-56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kley et al. in view of Miller et al. (U.S. Patent No. 6373568), of record.

Kley et al. discloses the invention as set forth above, except for a spectral matching module responsive to the spectroscopic signal output and operative to perform spectral matching operations with one or more known substances or samples, such as pharmaceuticals, pathological, or biological samples. It is well known in the art of

optical spectroscopy to compare reference optical spectra to reference optical spectra for the purpose of identification. Additionally, Miller et al. teaches a spectral imaging system (See for example Figure 4a) utilizing a plurality of sources (See 1 in Figure 4a; 10a-j in Figure 1) wherein a computer and program (See 63, 64 in Figure 4a) are used to perform weighting function calculations on spectral information such that further collected spectral data can be compared with this information to identify the samples (See Abstract; col. 4, lines 14-27; col. 9, line 11-col. 10, line 34). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to include a spectral matching module responsive to the spectroscopic signal output and operative to perform spectral matching operations with one or more known substances or samples, such as pharmaceuticals, pathological, or biological samples, as taught by Miller et al., in the spectrometer of Kley et al. for the purpose of providing automated, highly accurate means of sample identification.

Conclusion

18. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not

Art Unit: 2872

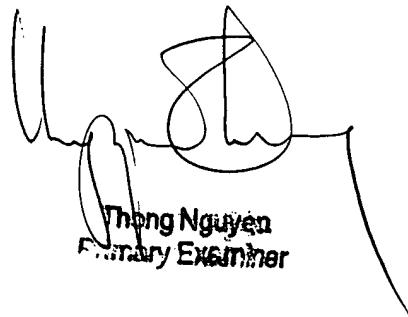
mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arnel C. Lavarias whose telephone number is 703-305-4007. The examiner can normally be reached on M-F 8:30 AM - 5 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 703-305-0024. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1782.


Arnel C. Lavarias
11/3/03


Thong Nguyen
Primary Examiner